



# How to Use Makerbot Thing-O-Matic

Hardware and Software Training

Dec 2012

### Stepstruder MK6+

The printing portion of the Thing-O-Matic uses a stepper motor to draw in a plastic filament, which is heated to a controlled temperature. The melted plastic is then pushed through the nozzle in a thin stream, building up the object in layers about 0.3 millimeters thick.

### HOT END

A cartridge applies heat to a metal core that melts the plastic. The core is wrapped in insulation.



### PRINT NOZZLE

Melted plastic extrudes from the tip to form layers of the object being printed.

**PLASTIC FILAMENT**  
Usually ABS plastic or PLA, a corn-based polymer.

**STEPPER MOTOR**

**HEATED BUILD PLATFORM**  
Minimizes curling of the plastic during cooling.

**STEPPER MOTOR CONTROLLERS**  
Translate commands from the motherboard into higher-current pulses to precisely move the stepper motors.

### Drive motors

Thing-O-Matic uses precision stepper motors to control the motion of the build platform. The Z-axis motor drives a threaded rod, the X- and Y-axis motors (not shown) drive belts. The motors move the Z axis as little as 0.0002 inches and the X and Y axes 0.0008 inches.

**Z-AXIS STEPPER MOTOR**

**Z STAGE**

**Y STAGE**

**Y-AXIS BELT**

**EXTRUDER CONTROLLER**

**MOTHERBOARD**  
Receives 3-D model data from a computer via a USB port or from an SD card, and sends it to controllers.

**SD CARD**  
**USB PORT**

Note: Internal wiring connections not shown

### Three axes of motion

To build an object in three dimensions, the printer uses stages, each moving along a different axis.



The **X STAGE** moves the build platform side to side...



...while the **Y STAGE** moves it front to back creating a single layer.



The **Z STAGE** moves the stepstruder vertically, creating additional layers, which can be seen on the object below.



Thing-O-Matic  
MakerBot INDUSTRIES

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- **Software Installation**
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- **Generate Gcode**
- **Build s3g. File**
- **Start MakerBot**
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# You Need

1. Computer
2. Makerbot
3. ABS filament
4. USB cable
5. Bot power cord
6. SD card
7. Tweezer

# Software Installation

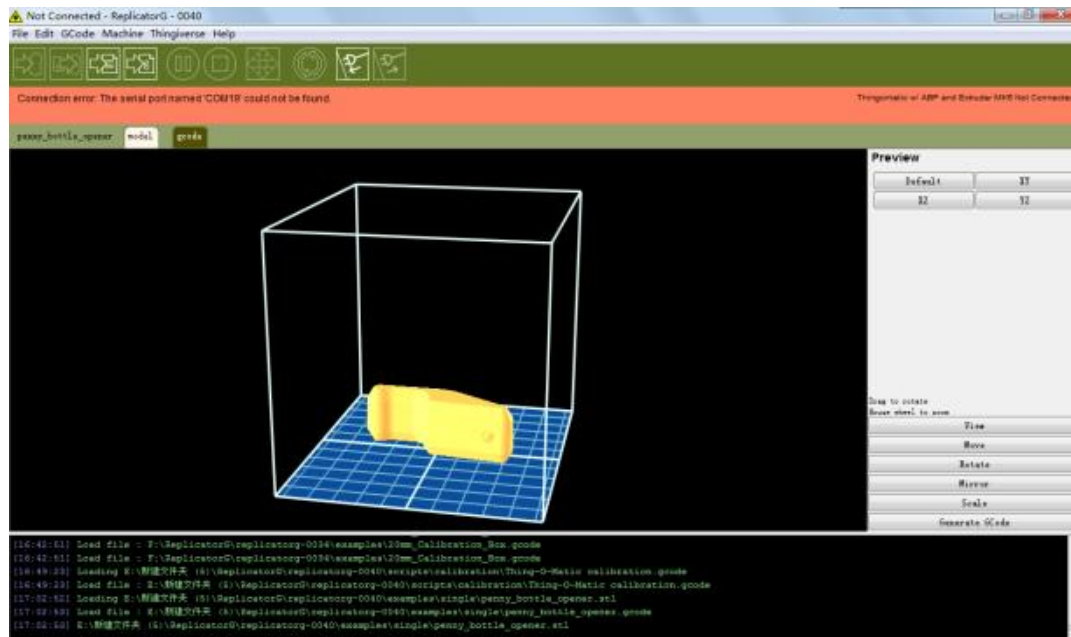
- Download:

<http://code.google.com/p/replicatorg/downloads/detail?name=replicatorg-0034-windows.zip&can=2&q=>

- Install ReplicatorG

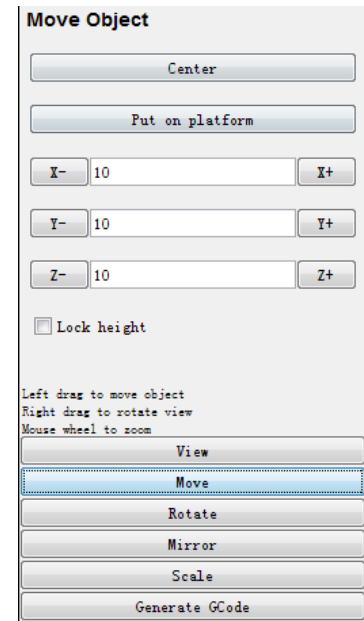
# Digital Model Preparation

- Open .stl file in ReplicatorG. Or double-click on the .stl file directly, and it will automatically open in ReplicatorG.



# Digital Model Preparation

- Position your model in ReplicatorG.  
Click **Move** button  
Click **Center** button  
Click **Put on Platform Button**



(The model should now lie flat and centered on the blue rectangle. The blue rectangle represents the build platform inside the MakerBot.)

# Digital Model Preparation

- You can also adapt your model through **Rotate**, **Mirror** and **Scale** button before **Center** and **Put on Platform**.
- Parameters could be adapted according to your requirements on the buttons' panel.



# Generate GCode

- Click **Generate GCode** button or  icon.
- Use settings as follows to start:

**Generate GCode**

Slicing Profile: Thing-O-Matic Slicing Defaults

☒ Use Raft/Support

Use support material: None

☒ Use default start/end gcode

☒ Use Print-O-Matic (stepper extruders only)

Plastic Extruder Defaults

Settings

Object infill (%) 10

Layer Height (mm) .29

Number of shells: 1

Feedrate (mm/s) 25

Travel Feedrate 50

Print temperature 225

Generate GCode Cancel

**Generate GCode**

Slicing Profile: Thing-O-Matic Slicing Defaults

☒ Use Raft/Support

Use support material: None

☒ Use default start/end gcode

☒ Use Print-O-Matic (stepper extruders only)

Settings

Plastic Extruder Defaults

Nozzle Diameter (mm) 4

Generate GCode Cancel

**Generate GCode**

Slicing Profile: Replicator slicing defaults

☒ Use Raft/Support

Use support material: None

☒ Use default start/end gcode

☒ Use Print-O-Matic (stepper extruders only)

Settings

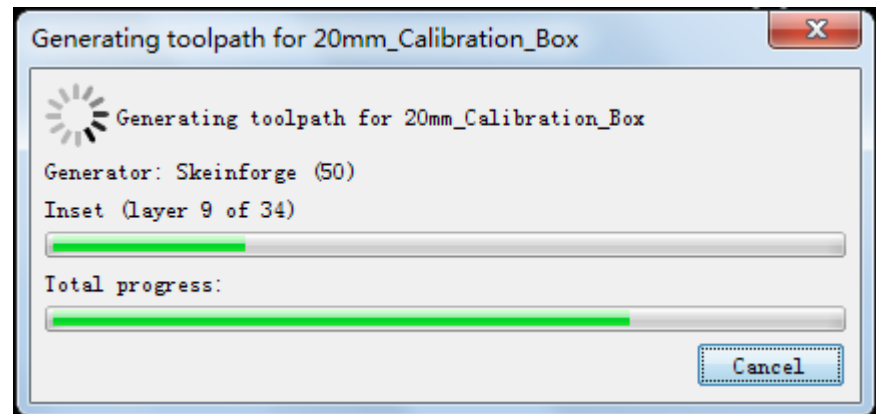
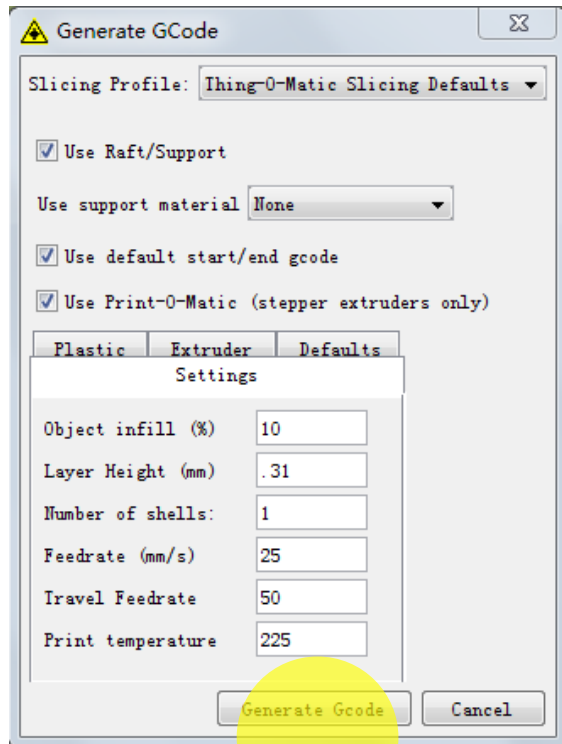
Plastic Extruder Defaults

Filament Diameter (mm) 1.70


Generate GCode Cancel

# Generate GCode

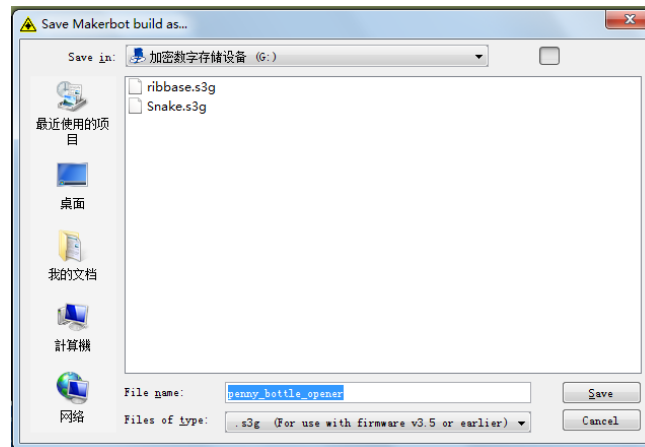
- Click **Generate** as follows




# Build s3g file

- Put SD card in the SD card slot.
- Click the Build to File icon 

(Build to File turns your STL into an s3g file.  
S3g is a format the MakerBot can understand.  
Save your s3g file to the SD card. )




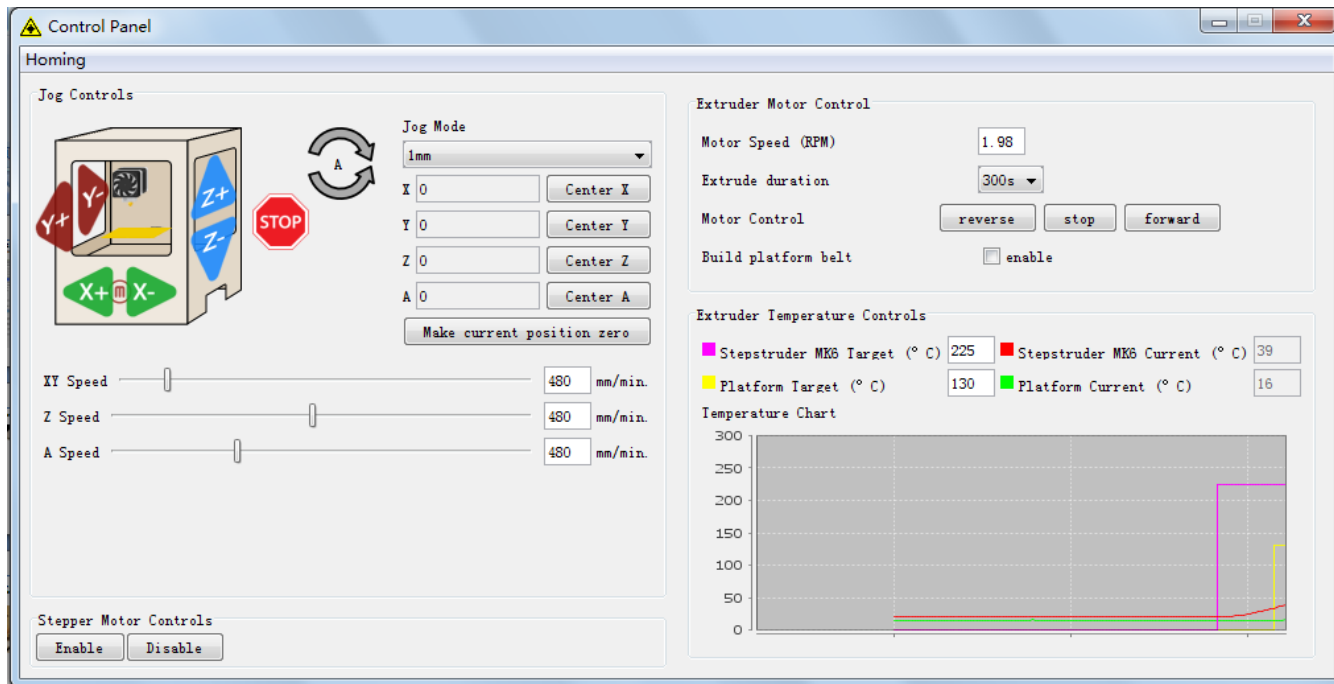
# Start MakerBot

- Plug in the black power cord and turn on the MakerBot.
- Plug in the USB cable.  
(flat end goes in your computer, square end goes in the MakerBot)
- Click the Connect icon. 



# Start MakerBot

- If you are using new ABS filament, click Control Panel icon  or press Ctrl + J or Select Control Panel from Machine Menu. And use setting as follows to start:



# Start MakerBot

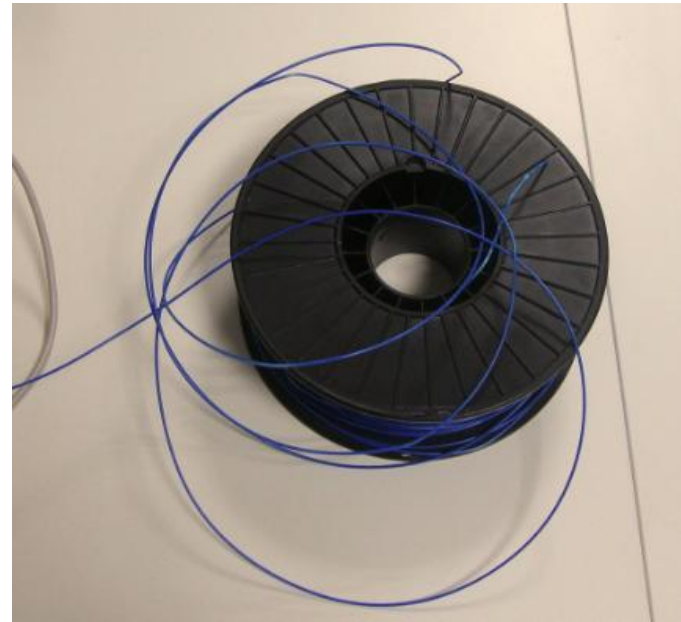
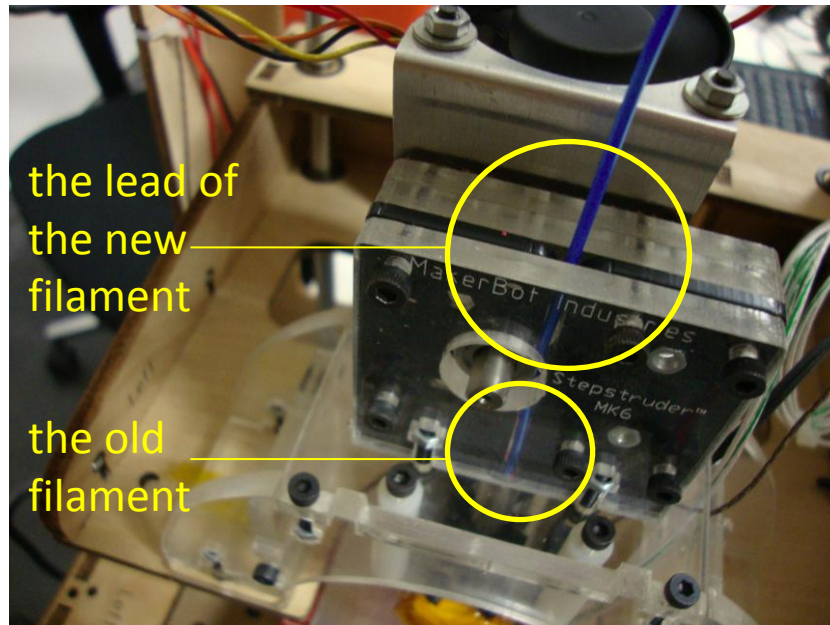
- Once Target Temp is reached, click **forward** to heat and extrude the old filament segment. Once the end the segment has sunken down to the inside of the plastic channel, click **stop**. Then fit the lead of the new filament inside. Don't take the old filament out, just insert the new filament right above it. Click the “**Forward**” button to push the new filament through. And loose the filament for material suply.  
(as the following pictures)

# Start MakerBot

- Select your print material (ABS filament)



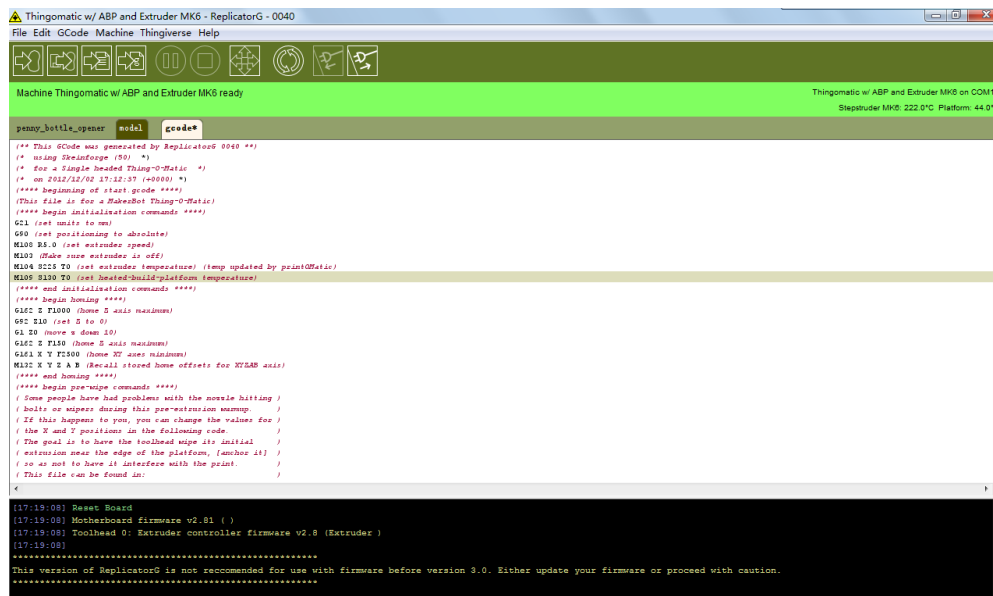
# Start MakerBot





# Start MakerBot

- Wipe up the printing platform with kitchen towel.
- Click **gcode** as follows and change the code line **M109 S100 T0** to **M109 S130 T0**



The screenshot shows the Thingomatic software interface. The top bar indicates 'Thingomatic w/ ABP and Extruder MK6 - ReplicatorG - 0040'. Below the menu bar (File, Edit, GCode, Machine, Thingiverse, Help) is a toolbar with icons for file operations and machine control. The main area is divided into two panes. The top pane, titled 'Machine Thingomatic w/ ABP and Extruder MK6 ready', shows machine status: 'Thingomatic w/ ABP and Extruder MK6 on COM19', 'Stepanther MK6: 222.0°C', and 'Platform: 44.0°C'. The bottom pane, titled 'penny\_bottle\_opener', shows G-code. The 'gcode' tab is selected, displaying a script that includes initialization commands and a line 'M109 S130 T0 (set heated-build-platform temperature)'. The bottom-most pane is a terminal window showing system messages: '[17:15:08] Reset Board', '[17:15:08] Motherboard firmware v2.81 ( )', '[17:15:08] Toolhead 0: Extruder controller firmware v2.8 (Extruder )', and a warning: 'This version of ReplicatorG is not recommended for use with firmware before version 3.0. Either update your firmware or proceed with caution.'

```
File Edit GCode Machine Thingiverse Help

Machine Thingomatic w/ ABP and Extruder MK6 ready


Thingomatic w/ ABP and Extruder MK6 on COM19
Stepanther MK6: 222.0°C Platform: 44.0°C

penny_bottle_opener node gcode

(** This GCode was generated by ReplicatorG 0040 **)
(* using Steinhilber (50) *)
(* for a single headed Thing-O-Matic *)
(* on 2012/12/02 17:12:37 (+0000) *)
(**** beginning of start gcode ****)
(This file is for a MakerBot Thing-O-Matic)
(**** begin initialization commands ****)
G21 (set units to mm)
G90 (set positioning to absolute)
M100 E1.0 (set extruder speed)
M102 (slow core extruder is off)
M104 S130 T0 (set extruder temperature) (temp updated by pointOfMatic)
M109 S130 T0 (set heated-build-platform temperature)
(**** end initialization commands ****)
(**** begin homing ****)
G1E2 Z T1000 (home Z axis maximum)
G92 Z10 (set Z to 0)
G1 Z move + down 10)
G1E2 Z T150 (home Z axis minimum)
G1E1 X Y T1500 (home XY axes minimum)
M1E2 X Y Z 0 (Recall stored home offsets for XYZAB axis)
(**** end homing ****)
(**** begin pre-wipe commands ****)
(* Some people have had problems with the nozzle hitting *)
(* bolts or wires during this pre-extension cleanup *)
(* If this happens to you, you can change the values for *)
(* the Z and Z position in the following code *)
(* The goal is to have the toolhead wipe its initial *)
(* extension near the edge of the platform, (achoo!) *)
(* so as not to have it interfere with the print. *)
(* This file can be found in: *)


[17:15:08] Reset Board
[17:15:08] Motherboard firmware v2.81 ( )
[17:15:08] Toolhead 0: Extruder controller firmware v2.8 (Extruder )
[17:15:08]
*****
This version of ReplicatorG is not recommended for use with firmware before version 3.0. Either update your firmware or proceed with caution.
*****
```

# Start to Print

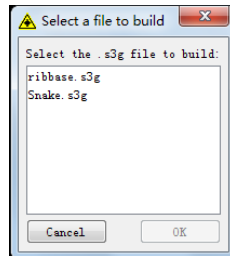
- Click Build:  (Wait for printing from PC)
- Or print from SD card – Eject the SD card from the computer and put the card in the MakerBot.



# Start to Print


- Click Build from SD card icon: 
- Choose your file from the list of items on the card.  
Click **OK**!

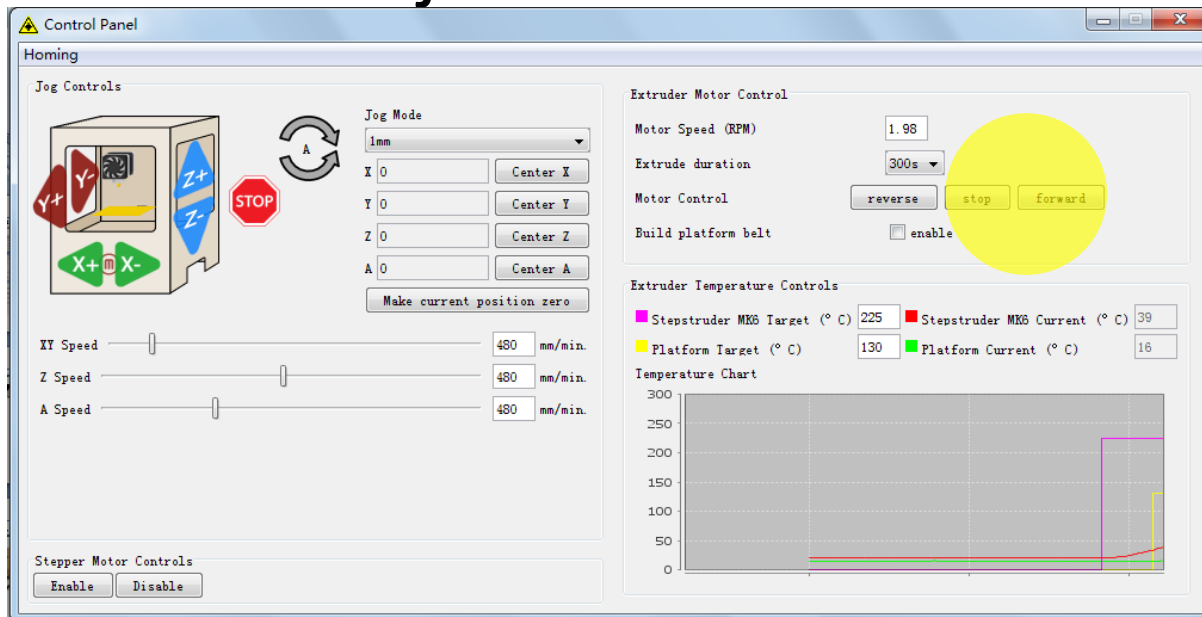
(if you see nothing in the list: close the popup, remove the card from the MakerBot, re-insert, and try again)





- Unplug the USB cable. You can start preparing your next print once unplugged because the MakerBot is using the SD card, not the computer, to run the print job.

# Take printed model out

- Wait for 3 minutes after Makerbot finishing printing, then click Control Panel icon  or press Ctrl + J or Select Control Panel from Machine Menu. And click Build platform belt **enable** to eject the model.



# Finish Printing

- When the print finished, click  icon
- Click  for moving print platform to a suitable position such as the center of the MakerBot
- Turn off the MakerBot and unplug USB cable and power cord